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⑤④ **Improved ring lighting for microscopes.**

⑤⑦ Improved ring lighting for microscopes, characterized in that it comprises substantially the combination of a light source (5) remote from the precious stone being examined, a glass fiber guide (8) extending to an annular end-piece (9) and a reflector (7) secured on the latter.

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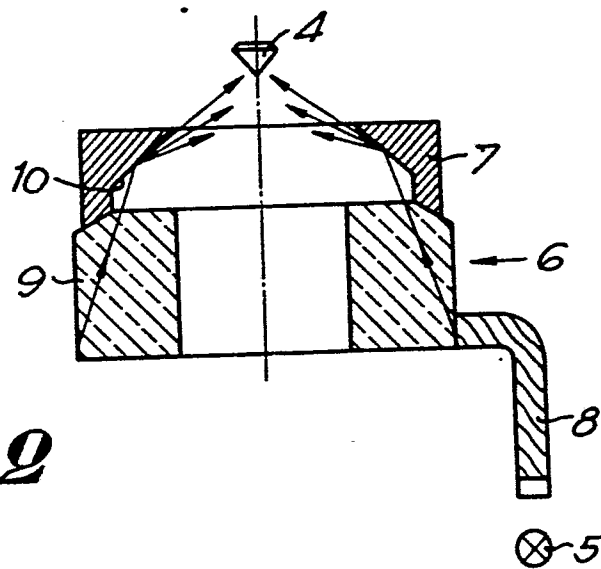


Fig. 2

Improved ring lighting for microscopes

This invention relates to an improved ring lighting for microscopes, more particularly microscopes such as those used for examination, more particularly as regards the purity of precious stones.

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It is known that such lighting for microscopes is extremely important since, for a good observation of the inclusions present in a precious stone, structural phenomena and any hindering light effect of that type resulting namely from reflections on the polished facets of the precious stone must be prevented.

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For this purpose, there has already been used from a long time a kind of lighting, more particularly a so-called dark field lighting comprising substantially a lighting screened for the eye, a black background provided under the diamond so that the light is located on the side of the precious stone, thereby impinging the said precious stone from a direction which is more or less perpendicular to the observation direction.

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The major drawback of said known dark field lighting lies principally in that the light intensity thereof is too weak to allow an optimum observation.

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It has also already been proposed to improve the light in-

tensity, e.g. by using a lamp having a higher wattage, but other drawbacks are resulting therefrom such as a too important heat evolution, a warm air stream along the precious stone, thereby forming heat vibrations hindering the observation around the precious stone, etc.

In order to prevent these last drawbacks, it has also already been suggested to use a lamp having a higher wattage with a suitable cooling system, but the drawback thereof lies in a very expensive device.

Thus, it is an object of the present invention to provide a ring lighting for the observation of a precious stone by means of a microscope while entirely excluding the aforesaid drawbacks and others in spite of the fact that the light intensity is substantially increased.

For this purpose, this ring lighting comprises substantially the combination of a light source remote from the precious stone being examined, a glass fiberlight guide extending to an annular end-piece and a reflector secured on the latter.

The characteristics of the improvements according to the invention will be more clearly pointed out hereafter by way of example and without any limitation through the following description of some preferred embodiments of a ring lighting according to the invention, reference being made to the enclosed drawings in which :

- 30 Figure 1 is a diagrammatic view of a known so-called dark field lighting;
 Figure 2 shows a cross-section through a ring lighting according to the invention;
 Figure 3 shows a modified embodiment of Figure 2;
35 Figures 4, 5 and 6 show still other modified embodiments of a lighting according to the invention.

Figure 1 shows diagrammatically a known dark field lighting, the microscope optics being indicated by 1, whereas the dark field lighting proper is formed, e.g. by an annular lamp 2 which is disposed behind a screen 3 relative to the microscope optics 1, whereas a black background 5 is provided behind the precious stone 4 being examined, still relative to the microscope optics 1.

Such arrangement has the previously mentioned drawbacks.

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Figure 2 shows the very simple ring lighting according to the invention, said lighting being mainly formed for the examination of a precious stone 4 by a separate light source 5, a glass fiber light guide 6 known per se and a reflector 7.

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As it is known, the light irradiated by the light source 5 is collected by a bundle of glass fibres 8, the fibres of said bundle being suitably distributed in an annular end-piece 9 in order to transmit an annulus of light to the upper surface of said end-piece 9. The light irradiated through the end-piece 9 is then collected by the reflector 7 which is therefore provided with an internal conical surface 10 so that, by using a light source 5 having a high light intensity, a large amount of light is thereby projected onto the precious stone being examined, the light rays reflected by the reflector 7 being maintained as horizontal as possible relative to the vertical observation direction of the precious stone 4 so that, by locating the light source 5 at a suitable distance from the observation location, the heat evolved from said source has no influence on the observation.

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In order to maintain the reflections on the polished facets of the precious stone at the lowest possible minimum, it will be preferable to maintain the surface 10 in a rough state, thereby providing a diffuse reflection. The material for this rough embodiment will be e.g. metal, synthetic material, but also, e.g. glass.

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This diffuse effect can be still increased by adapting a mat glass 11 above the reflector 7 as represented namely in figure 3.

5 Finally, figures 4, 5 and 6 show still three modified embodiments, the reflector 7 of figure 4 being provided with a concave annular surface 12 whereas the reflector 7 of figure 5 is formed by a convex annular surface 13, figure 6 showing an embodiment wherein an annular mat glass 14 is applied in
10 the reflector 7 in combination or not with a mat glass 11.

It is apparent that the present invention is not at all limited to the embodiment described by way of example and illustrated in the attached drawings, but such ring lighting
15 may be made in various combinations without departing from the scope of the invention.

Claims.

1.- Improved ring lighting for microscopes, characterized in that it comprises substantially the combination of a light
5 source (5) remote from the precious stone being examined, a glass fiber guide (8) extending to an annular end-piece (9) and a reflector (7) secured on the latter.

2.- Improved ring lighting according to claim 1, characterized
10 in that the reflecting portion of the reflector (7) is maintained in a rough state.

3.- Improved ring lighting according to claims 1 or 2, characterized in that a mat glass (11) is applied on the reflector (7).
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4.- Improved ring lighting according to claims 1 or 2, characterized in that a mat glass (14) is applied in the reflector (7).
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5.- Improved ring lighting according to one of the preceding claims, characterized in that the reflector (7) has a conical reflecting surface.

25 6.- Improved ring lighting according to one of claims 1 to 4, characterized in that the reflector (7) has a concave annular reflecting surface (12).

7.- Improved ring lighting according to one of claims 1 to 4,
30 characterized in that the reflector (7) has a convex annular reflecting surface (13).

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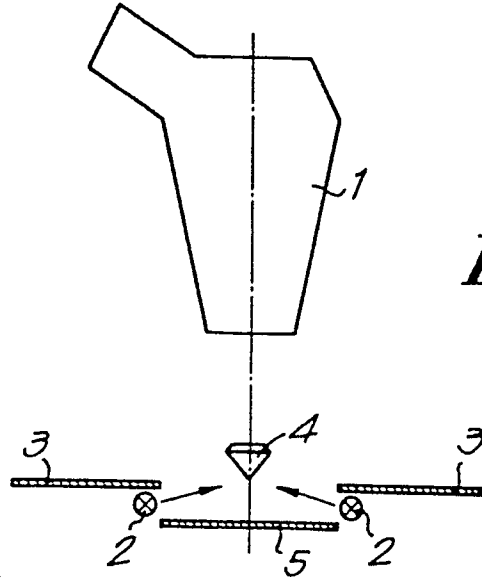


Fig. 1

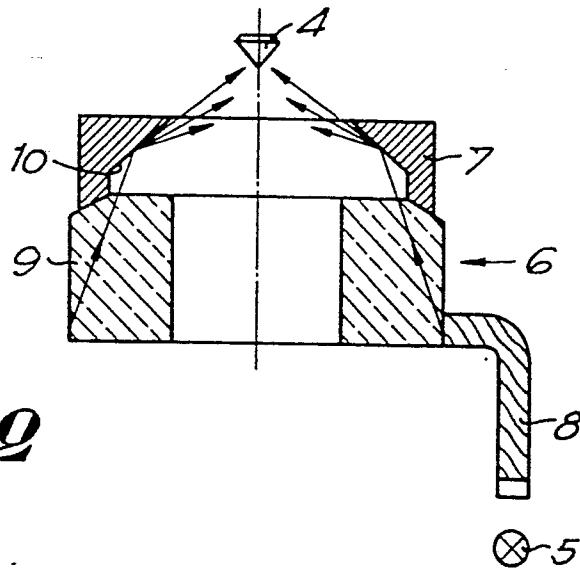


Fig. 2

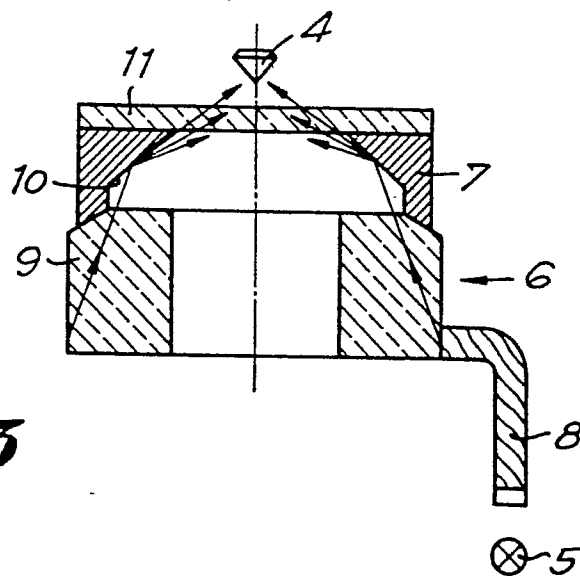


Fig. 3

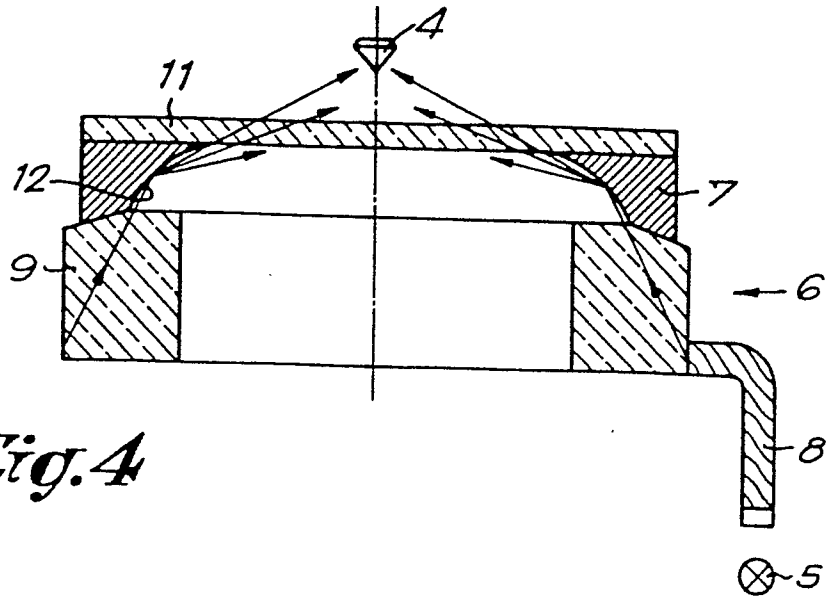


Fig. 4

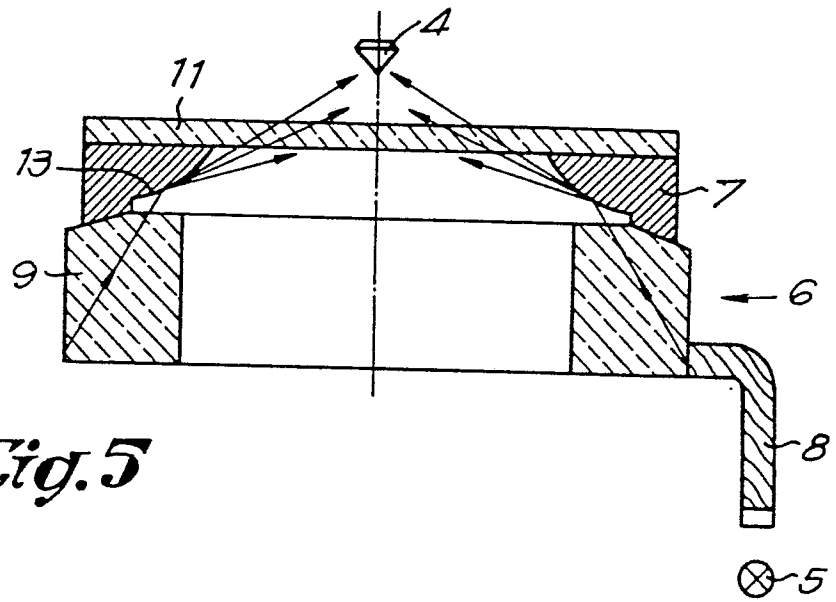


Fig. 5

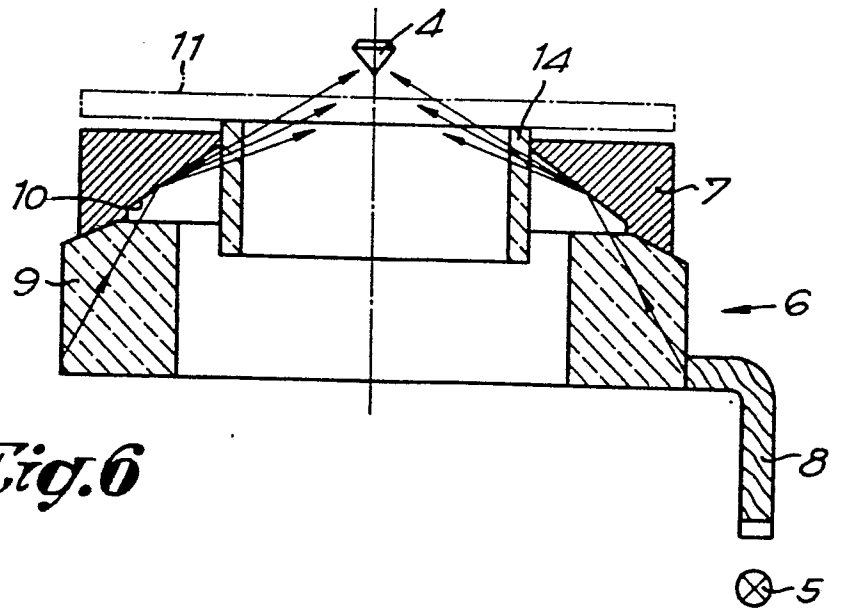


Fig. 6



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	<u>DE - A - 1 622 939 (G.G. REINERT)</u> * Page 2, lines 3-14; figures * ----	1	G 02 B 21/06 5/16 G 01 N 33/38 21/87
	<u>DE - A - 2 422 417 (OLYMPUS)</u> * Page 4, lines 13-21; claims; figures * ----	3,5	
	<u>DE - A - 1 447 189 (JENOPTIK)</u> * Claims; figures * ----	3,6	
	<u>US - A - 4 127 318 (H. DETERMAN)</u> * Abstract; figures * ----	5	TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
	<u>US - A - 2 157 437 (R.M. SHIPLEY)</u> * Page 1, column 2, lines 34-50; figures * -----	6	G 02 B 21/06 21/08 G 01 N 33/38 21/87
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
<input checked="" type="checkbox"/> The present search report has been drawn up for all claims			&: member of the same patent family, corresponding document
Place of search	Date of completion of the search	Examiner	
THE HAGUE	16-07-1980	PFAHLER	